

# Harmonic filters FN 3410HV / FN 3411HV

## ECOsine™ Passive harmonic filters for 690V applications

**SCHAFFNER**

energy efficiency and reliability



- Dedicated range of harmonic filters for 690VAC systems
- Highly efficient harmonic current mitigation
- Help to comply with IEEE-519 and other PQ standards
- Increased equipment service life and system reliability
- More efficient utilization of electrical system capacity
- Ideal for motor drives

### Approvals



### Typical specifications

Nominal operating voltage:	3x 690VAC
Voltage tolerance range:	3x 586 to 760VAC
Operating frequency:	50Hz ±1Hz
Nominal motor drive input current rating*:	10 to 320A @ 50°C
Nominal motor drive input power rating:	7.5 to 250kW
Total harmonic current distortion THID**:	<5% @ rated power (filters up to 37kW) ~5% @ rated power with Ldc (filters 45kW and up)
Total demand distortion TDD:	According to IEEE-519, table 10-3
Efficiency:	>98% @ nominal line voltage and power
High potential test voltage:	P → E 2500VAC (1min)
Protection category:	IP20
Cooling:	Internal fan cooling
Overload capability:	1.6x rated current for 1 minute, once per hour
Ambient temperature range:	-25°C to +50°C fully operational +50°C to +70°C derated operation*** -25°C to +85°C transport and storage
Flammability corresponding to:	UL 94V-2 or better
Design corresponding to:	UL508, EN61558-2-20, CE (LVD2006/95/EC)
MTBF @ 50°C/690V (Mil-HB-217F):	tbd
SCCR****:	100kA

\* ECosine filters reduce RMS input and peak current by reducing harmonic currents and improving true power factor.

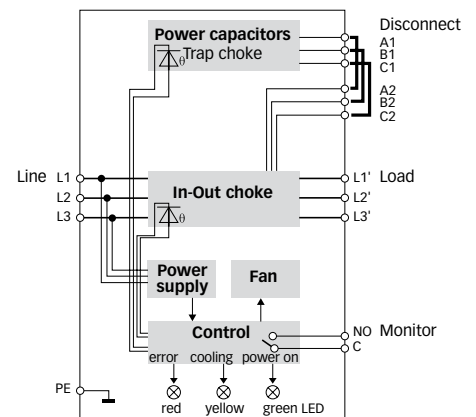
\*\* System requirements: THVD <2%, line voltage unbalance <1%

Note: performance specifications in this brochure refer to six-pulse diode rectifiers. SCR rectifier front-end will produce different results, depending upon the firing angle of the thyristors.

\*\*\* Iderated = Inominal \* √(85°C-Tamb)/35°C

\*\*\*\* External UL-rated fuses required.

### Typical electrical schematic



### Features and benefits



Schaffner ECosine™ harmonic filters represent an economical solution to the challenge of load-applied harmonics mitigation in three-phase power systems. With a plug-and-play approach and more compact dimensions than comparable products, they can be quickly installed and easily commissioned. They increase the reliability and service life of electric installations, help utilize electric system capacity better, and are the key to meet Power Quality standards such as IEEE 519.

ECOsine™ filters calm your harmonic waves. Schaffner ECosine™ filters can be applied to virtually any kind of power electronics with front-end six-pulse rectifiers, where harmonic current distortion needs to be reduced to defined limits. Typical 690V applications, where the above-mentioned non-sinusoidal consumers of power can account for a significant portion of the load, include:

### Typical applications

- Equipment with front-end six-pulse rectifier
- Motor drives
- Factory automation equipment
- Water/wastewater treatment facilities
- Fan and pump applications
- Oil and gas exploration
- Chemical industry

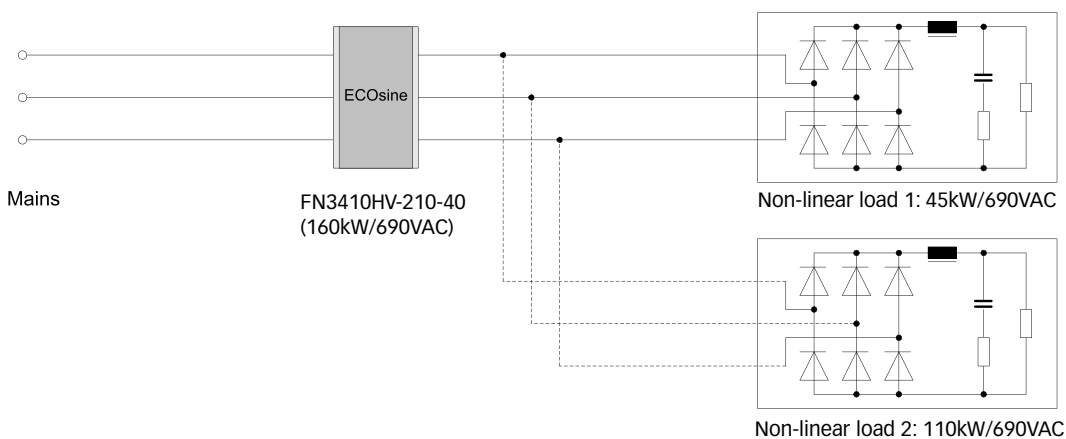
Filter selection table (50Hz)

Filter*	Rated load power @ 690VAC/50Hz [kW]	Power loss @ 25°C/50Hz [W]	Input/Output connections		Capacitor disconnections	Weight [kg]
						
FN341xHV-10-44	7.5	150	-44		-44	20
FN341xHV-13-44	11	209	-44		-44	21
FN341xHV-16-33	15	270	-33		-44	29
FN341xHV-24-33	18.5	333	-33		-44	33
FN341xHV-32-53	22	374	-53		-33	44
FN341xHV-38-53	30	480	-53		-33	48
FN341xHV-45-53	37	555	-53		-33	56
FN341xHV-60-35	45	610	-35		-34	58
FN341xHV-75-35	55	690	-35		-34	62
FN341xHV-90-35	75	860	-35		-34	77
FN341xHV-110-35	90	960	-35		-34	91
FN341xHV-150-40	110	1145	-40		-35	131
FN341xHV-180-40	132	1275	-40		-35	147
FN341xHV-210-40	160	1600	-40		-35	169
FN341xHV-260-99	200	1940		-99	-35	230
FN341xHV-320-99	250	2500		-99	-35	233

\* To compile a complete part number, please replace the x with a 0 for diode or 1 for SCR rectifiers.  
 Filter to be selected by system voltage and load (motor drive) power. Note: the harmonic filter will reduce RMS input current. Therefore, filter selection by current rating, as it is common for EMC/EMI filters, is not suitable.

Filter application

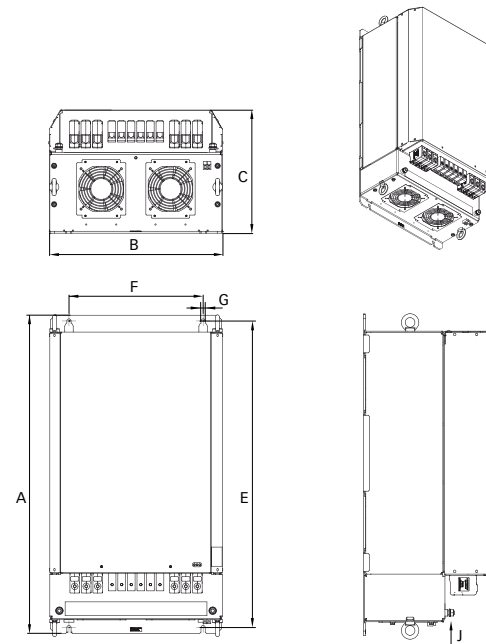
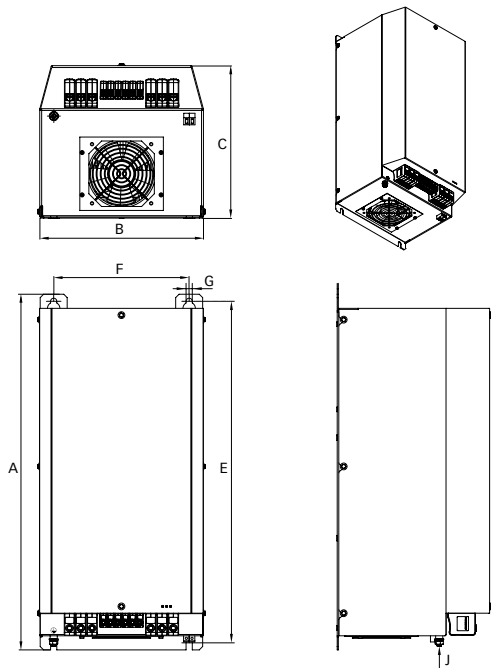
ECOsine™ filters are best installed directly at the input of 6-pulse rectifiers. It is possible to connect several non-linear loads (e.g. motor drives) in parallel. In this case the rating of the filter must match the sum of the power ratings of drives connected to it. The use of a (built-in) DC-link choke is recommended for all motor drives 45kW and up for best harmonics mitigation performance and DC-link capacitor protection.



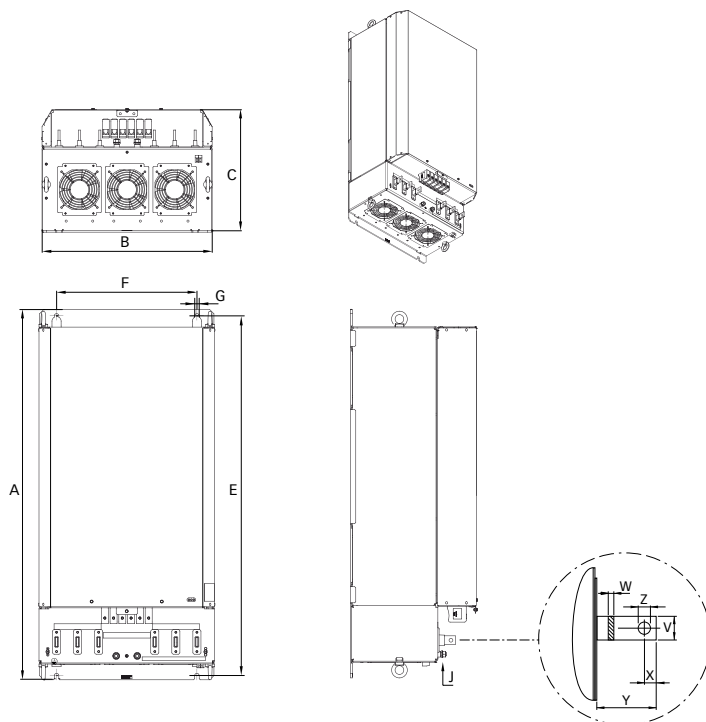
**Mechanical data**

FN 3410HV / FN 3411HV-10 to -110

FN 3410HV / FN 3411HV-150 to -210



FN 3410HV / FN 3411HV-260 to -320



Filters with busbar terminals are shipped with a protective cover.

**Installation**







Detailed installation and wiring instructions as well as cooling requirements can be found in the Installation Manual available from every Schaffner sales point or from [www.mycosine.com](http://www.mycosine.com)

**Dimensions**

FN341xHV-...	10	13	16	24	32	38	45	60	75	90	110	150	180	210	260	320
A	430	430	520	520	590	590	590	750	750	750	750	830	830	830	1055	1055
B	210	210	250	250	300	300	300	320	320	320	320	450	450	450	500	500
C	210	210	280	280	300	300	300	300	300	300	300	320	320	320	360	360
E	410	410	495	495	565	565	565	725	725	725	725	800	800	800	1025	1025
F	170	170	200	200	250	250	250	270	270	270	270	350	350	350	400	400
G	9	9	11	11	11	11	11	11	11	11	11	11	11	11	13	13
J	M6	M6	M8	M8	M8	M8	M8	M10	M10	M10	M10	M10	M10	M10	M10	M10
V															25	25
W															6	6
X															12.5	12.5
Y															50	50
Z															11	11

All dimensions in mm; 1 inch = 25.4mm  
 Tolerances according to: ISO 2768-m / EN 22768-m

**Filter connector cross sections**

	-33	-34	-35	-40	-44	-53
						
<b>Solid wire</b>	16mm <sup>2</sup>	35mm <sup>2</sup>	50mm <sup>2</sup>	95mm <sup>2</sup>	10mm <sup>2</sup>	25mm <sup>2</sup>
<b>Flex wire</b>	10mm <sup>2</sup>	25mm <sup>2</sup>	50mm <sup>2</sup>	95mm <sup>2</sup>	6mm <sup>2</sup>	16mm <sup>2</sup>
<b>AWG type wire</b>	AWG 6	AWG 2	AWG 1/0	AWG 4/0	AWG 8	AWG 4
<b>Recommended torque</b>	1.5 – 1.8Nm	4.0 – 4.5Nm	7 – 8Nm	17 – 20Nm	1.0 – 1.2Nm	2.0 - 2.3Nm

Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on filter connectors.

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